

Sampling and Analysis Plan
Roanoke River Basin PCB TMDL Development
(Virginia)

FINAL - SUMMARY

Prepared for
U.S. Environmental Protection Agency – Region III
Virginia Department of Environmental Quality
U.S. Fish and Wildlife Service

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Introduction

Virginia's 303(d) list includes several waterbodies in the Roanoke River Basin that were listed as impaired due to elevated Polychlorinated Biphenyl (PCB) concentrations that have been found in fish tissue and sediment samples. The Virginia Department of Environmental Quality (DEQ) first collected information on PCB levels in the Roanoke Basin in 1971. Fish tissue and sediment sampling for PCBs in the Roanoke Basin resumed in 1993 and a rotating basin monitoring schedule is currently ongoing as part of the Statewide Fish Tissue and Sediment monitoring program. The Virginia Department of Health (VDH) has issued fish consumption advisories for several sections of the Roanoke (Staunton) River and tributaries since 1998 based on the fish tissue data collected by DEQ. DEQ 2004 303(d) PCB impaired segments and the current VDH fish consumption advisory segments (issued on 12/13/04) along the Roanoke River mainstem and tributaries upstream of the Dan River confluence are shown in Figure 1.

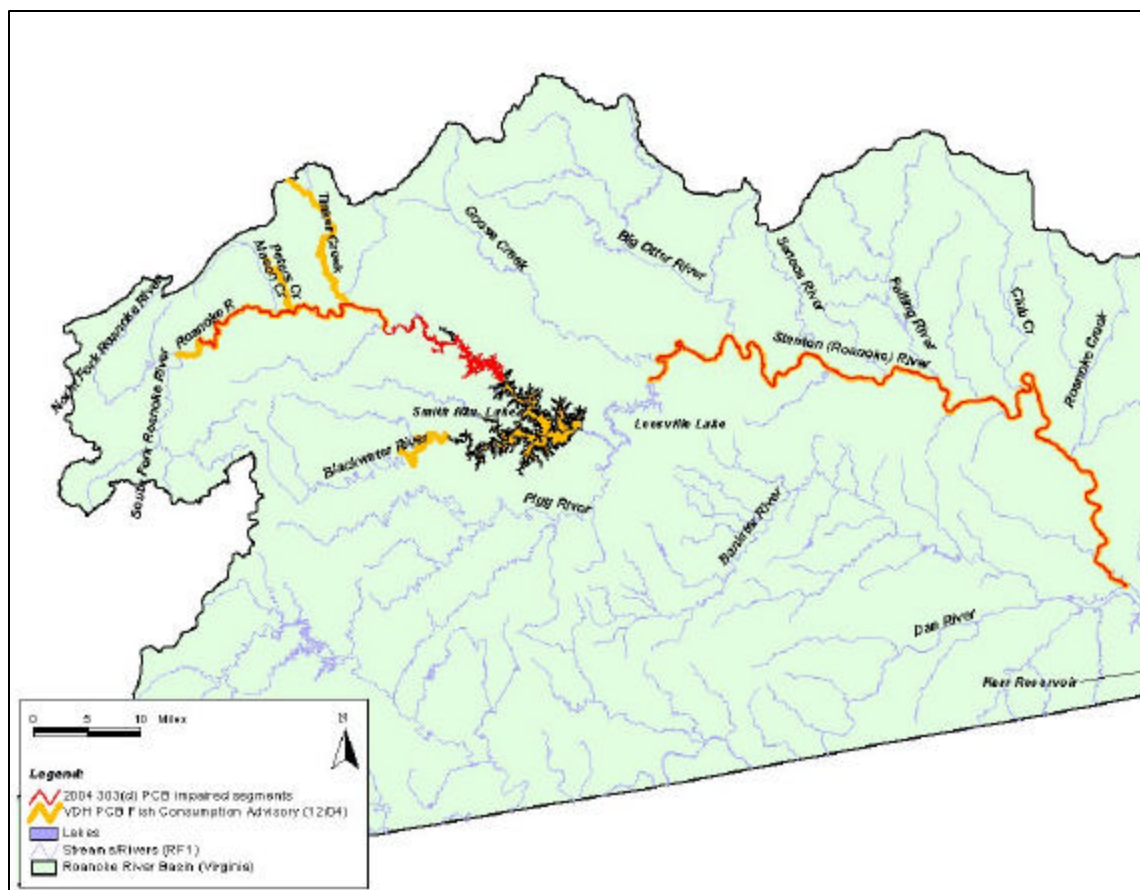


Figure 1. PCB impaired segments and fish consumption advisories (as of 12/13/04)

Section 303(d) of the Clean Water Act requires states to develop Total Maximum Daily Loads (TMDLs) for waters that do not meet water quality standards. The objective of the Roanoke PCB TMDL study is to identify the sources of PCB contamination in the watershed and to determine the reductions required to achieve water quality standards for PCB impaired segments.

Additional information on known and possible PCB sources in the watershed from past studies was recently collected and included in a source assessment data inventory. Based on this information and further analyses of the PCB data fish tissue and sediment data collected to date, additional data needs and

proposed monitoring stations are detailed in this Sampling and Analysis Plan (SAP). Additional monitoring is needed to help identify PCB sources in the watershed for TMDL development and implementation planning. This draft SAP will be refined over the next couple months based on available funding and further review of data needs required to complete TMDL development. A Quality Assurance Program Plan (QAPP) will be developed concurrently to support additional PCB sampling and other TMDL monitoring activities in the watershed.

PCB Sampling Methods

Additional PCB data will be collected at selected monitoring locations in the watershed to help identify active and legacy PCB sources for TMDL development. Sampling will include the use of semi-permeable membrane devices (SPMDs) and a high resolution-low detection level analysis method (1668A) to assess water column PCB concentrations, as well as effluent concentrations at selected facility outfalls. Lipid-containing SPMDs represent an innovative passive sampling technology for monitoring and assessing trace levels of hydrophobic organic contaminants, including PCBs. These sampling and analysis methods have been used in similar PCB source identification studies and are more effective than traditional water column sampling and analysis. Sediment core sampling may also be conducted in future monitoring efforts to help identify sediment “hot spots” in the watershed, which are depositional areas that contribute PCBs to the water column and biota. A brief description of these methods is provided below.

Proposed Monitoring

The primary objective of the SAP is to identify additional PCB monitoring needs for source identification. Additional data collection may be needed in the future depending on the initial sampling results and for modeling purposes.

DEQ submitted a list of monitoring stations to be considered for the Roanoke River Basin PCB TMDL study. Proposed sampling locations were identified based on the results from previous monitoring studies and knowledge of known and possible PCB sources in the watershed. The design of the sampling plan was tailored to re-assess known hotspots and to address data gaps identified by previous monitoring studies. The proposed monitoring stations, their relationship to possible upstream PCB sources and previous monitoring efforts, and the type of monitoring to be conducted are presented in Table 1. Stations are presented in an upstream-downstream progression and grouped by the Roanoke River subwatershed that they are located in (upper, middle, or lower). In addition, each station was designated as either a primary or follow-up station. Sampling will be conducted at all primary stations in Fall 2005. Data gaps will be assessed after reviewing the sampling results and additional monitoring at primary and follow-up stations will be conducted in the future as needed.

Table 1. DEQ proposed monitoring stations

Station ID	Station Description	SPMD	Effluent	Ambient
Upper Roanoke Primary Stations				
4AROA227.42	Located approximately 0.26 miles downstream of the confluence of the North and South Forks of the Roanoke River. This station will provide information on possible PCB sources located on the North or South Forks. Co-located with USGS Gage Station-Lafayette, VA.	x		x
4AROA219.00	Located approximately 0.99 miles downstream of fish tissue and sediment station 4AROA219.99. Co-located with USGS Gage Station-Glenvar, VA.	x		x
4AROA215.13	Located in Salem City below Green Hill Park, above Mason's Creek.	x		

Station ID	Station Description	SPMD	Effluent	Ambient
4AMSN000.67	Located near the mouth of Mason Creek, upstream of DEQ sediment and fish tissue station 4AMSN000.60 in the City of Salem. Depending on field evaluation this station maybe closer to the confluence of the Roanoke River.	x		
4APEE000.00	Located near the confluence of the Roanoke River. This station is below fish station 40PEE000.49 and the sediment and fish station 4APEE001.04. This station is below Roanoke Electric Steel and Shaffer's Crossing.	x		
4AROA207.08 Roanoke River downstream of Peters Creek	Located on the Roanoke River below Peters Creek. This station is located in the City of Roanoke This station is located upstream of Wasena Park near Memorial Bridge and below Evans Paint.	x		
Roanoke Electric Steel Corporation	Located on the Roanoke Electric Steel Corporation outfall. Facility located on the 2400 block of Patterson Ave SW near the riverfront in the City of Roanoke.		x	
Western Virginia Water Authority Regional WPCP	Located on the Western Virginia Water Authority Regional WPCP outfall. Facility located at 1402 Bennington St SE in the City of Roanoke.		x	
4AROA204.76	This station is located downstream of Ore Branch, near Virginia Scrap Iron Company and above American Viscose (now the Roanoke Industrial Park).	x		
4AROA202.20	Co-located with DEQ sediment and fish tissue station 4AROA202.20. This station is located below American Viscose and upstream of the Roanoke STP	x		
4ATKR000.69	Co-located with DEQ sediment and fish tissue station 4ATKR000.69. This station maybe moved closer to the confluence depending on field evaluation.	x		
4AROA200.06 Roanoke River downstream of Tinker Creek	Located on the Roanoke River below Tinker Creek and approximately 0.60 miles downstream of the Roanoke STP.	x		
Upper Roanoke Follow-up Stations				
Barnhardt Creek	Located at the mouth of Barnhardt Creek. This stream is a tributary to the Roanoke River, downstream of the Mason Creek confluence.			
Mud Lick Creek	Located at the mouth of Mud Lick Creek. This stream flows into the Roanoke River, upstream of the Peters Creek confluence			
Murray Run	Located at the mouth of Murray Run. This stream is a tributary to the Roanoke River, just upstream of the Ore Branch confluence			
Ore Branch	Located at the mouth of Ore Branch. This small stream flows through industrialized areas in the City of Roanoke			
Lick Run	Located at the mouth of Lick Run. This stream drains a large portion of the City of Roanoke, including several possible PCB source facilities and other sites.			
Tinker Creek Above City of Roanoke	Located on Tinker Creek north of the Roanoke City limits.			
Glade Creek	Located at the mouth of Glade Creek, near Walnut Avenue. This Tinker Creek tributary drains commercial/industrial areas in the City of Roanoke and the Town of Vinton.			
Middle Roanoke Primary Stations				
4AROA199.20	Located below Niagara Dam upstream of an old Roanoke County landfill. This station is co-located with DEQ fish tissue station 4AROA199.20 and USGS Gage Station-Niagra, VA., adjacent to the Blue Ridge Parkway in Roanoke County.	x		x
4AROA196.98	Located at Explore Park below the confluence with Back Creek. A closed Roanoke Regional landfill is located upstream of this station.	x		
Middle Roanoke Follow-up Stations				
Back Creek	Co-located with DEQ sediment station 4ABAA000.03, located near the mouth of Back Creek. The Roanoke Regional Landfill is located along Back Creek and contributes runoff to this sampling point.			
4ABWR019.75	Located on the Blackwater River where the backwaters of the Smith Mountain Lake Dam begin.			

Station ID	Station Description	SPMD	Effluent	Ambient
4APGG003.29	Located on the Pigg River at the Route 605 bridge.			
Lower Roanoke Primary Stations				
4AROA137.00 Below Leesville Lake Dam	Co-located with DEQ station 4AROA0137.00, just downstream of Goose Creek below the Leesville Lake Dam. The APCO Leesville Hydroelectric Plant is located at the dam site. Goose Creek includes several possible PCB source sites in the upper portion of its watershed. The upper and middle Roanoke River subwatersheds (including the Blackwater River and Pigg River) drain to this site.	x		
4AROA128.97 US of Altavista	Approximately co-located with existing DEQ sediment station 4AROA128.98. This station is located upstream of BGF Industries and several possible PCB sources in the Altavista/Hurt area.	x		
Burlington Industries LCC Hurt Plant	Located on the Burlington Industries outfall approximately 0.08 miles downstream of the Sycamore Creek Roanoke River confluence.		x	
4ALYH000.21 Lynch Creek	Located near the mouth of Lynch Creek in the Town of Altavista. DEQ sediment station 4ALYH000.02 was sampled in 1999 at the proposed location. This station will provide information on possible PCB sources located in the Lynch Creek watershed including: Blanks Exxon, Hardy Texaco, Watts Chevron, the Altavista oil distributor wet area, in addition to possibly capturing runoff from BGF Industries, A. O. Smith, an Schrader Bridgeport.	x		
4AROA128.94 Lane West Landfill	Located on the eastern bank of Lynch Creek in Altavista along the northern bank of the Staunton River. This landfill was originally scheduled to be monitored in the summer of 2000, according to Altavista/Hurt facility surveys, but was not sampled due to safety concerns	x		
Altavista Town - Wastewater Treatment Plant	Located on the Altavista WTP outfall in the town of Altavista at the confluence of Reed Creek and the Roanoke River near Ricky Van Shelton Drive.			
Upstream of BGF Industries	Stormwater grab sample upstream of BGF Industries to isolate from stormwater flow through/around BGF site.			x
4AXLN000.05 X-trib of Roanoke (BGF)	Located on an unnamed tributary that flows through the BGF Industries site to the Staunton River.	x		
4AROA128.21 Lane East Landfill	Located on the northern bank of the Staunton River, near DEQ sediment station 4AXXZ000.05. This landfill was originally scheduled to be monitored in the summer of 2000, according to Altavista/Hurt facility surveys, but was not sampled due to safety concerns.	x		
4AROA125.59 DS of Altavista	Co-located with DEQ sediment and fish tissue station 4AROA125.59 on the Roanoke approximately 0.65 miles below the Big Otter River confluence. This station captures the runoff and flow from the facilities/sites located in the Altavista/Hurt area and will also provide information on possible contributions from the Big Otter River watershed.	x		
4ABOR000.62 Big Otter River at Route 712	Located approximately 0.62 miles upstream of the mouth of the Big Otter River. This station captures the runoff and flow from the facilities/sites located in the Big Otter River subwatershed.	x		
4AROA097.76 US of Brookneal	Located on the Staunton River approximately 0.70 miles upstream of DEQ sediment station 4AROA097.06. This location captures the runoff and flow from the portion of the watershed upstream of the Town of Brookneal.	x		
Dan River Inc. - Brookneal	Located on the Dan River Inc. outfall in the town of Brookneal near Corporation Branch and Mattox Street.		x	
4ACOR000.21 Corporation Branch	Located on Corporation Branch, which is a small tributary that flows through Brookneal to the Staunton River. Dan River Inc. is located along the tributary, directly upstream of the proposed sampling location	x		
4AFRV002.78 Falling River DS of Brookneal STP at Route 40	Located approximately 0.34 miles downstream of DEQ sediment station 4AFRV003.12 near Route 40.	x		

Station ID	Station Description	SPMD	Effluent	Ambient
4AROA090.50 DS of Brookneal	Located on the Stanton River directly above the mouth of Catawba Creek. This location captures the runoff from possible PCB sources located in Brookneal, including Dan River Inc., the Town of Brookneal Staunton River Lagoon, and the Brookneal Hatchery.	x		
4AROA067.91 at Route 746 Scuffletown Road near Randolph	Co-located with DEQ sediment and fish tissue station 4AROA067.91 approximately 8.85 miles downstream of the Club Creek Roanoke River confluence. This location captures discharges from facilities located in the Keysville/Drakes Branch Virginia area.	x		x
4AROA059.12 at Route 92 Clover Road near Clover	Co-located with DEQ sediment and fish tissue station 4AROA059.12 approximately 5.33 miles downstream of the Horsepen Creek Roanoke River confluence. This location captures discharges from facilities located in the Clover Virginia area.			x

Known and possible PCB sources for which locational information was available were plotted in GIS. These facilities/sites were cross referenced with existing monitoring data to examine the spatial relationships between known and possible PCB sources in the watershed, sediment and fish tissue PCB monitoring results, and the proposed PCB monitoring stations. Because of the large number of possible PCB sources in the watershed, focus maps were developed for priority areas including the City of Roanoke and vicinity, the Altavista/Hurt area, and the Brookneal area (Figures 2, 4, and 5 respectively). The facilities/sites identified in these areas are included on the regional maps, but are not labeled. The two regional maps also show the proposed monitoring stations, PCB source information, and previous sampling results for the Upper-Middle Roanoke watershed (Figure 3) and the Staunton River (Lower Roanoke) watershed (Figure 6). Note that the scale for the fish tissue and sediment symbols is not presented in the legend for the regional maps due to space limitation, however, the scale is the same as presented in the focus maps.

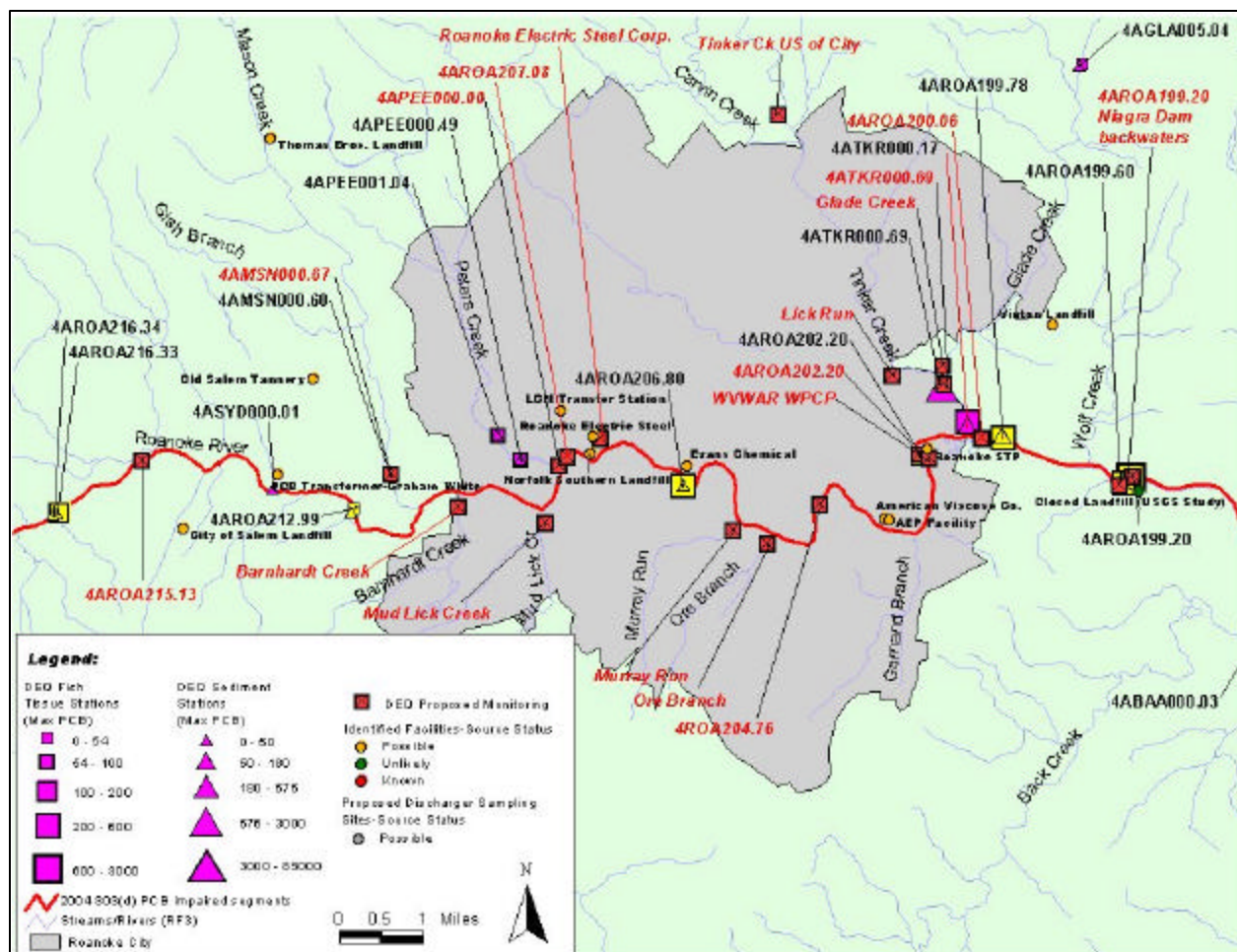
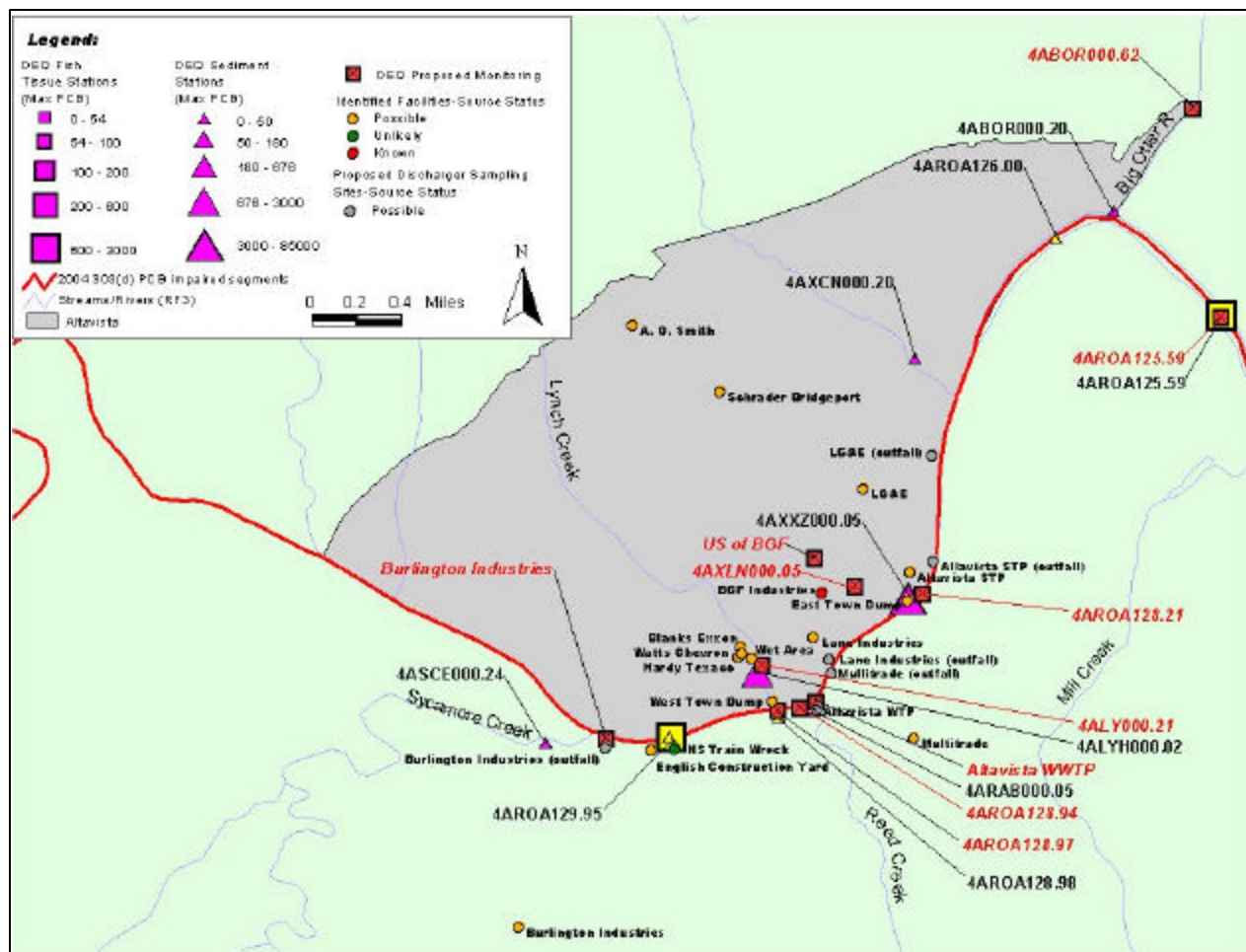
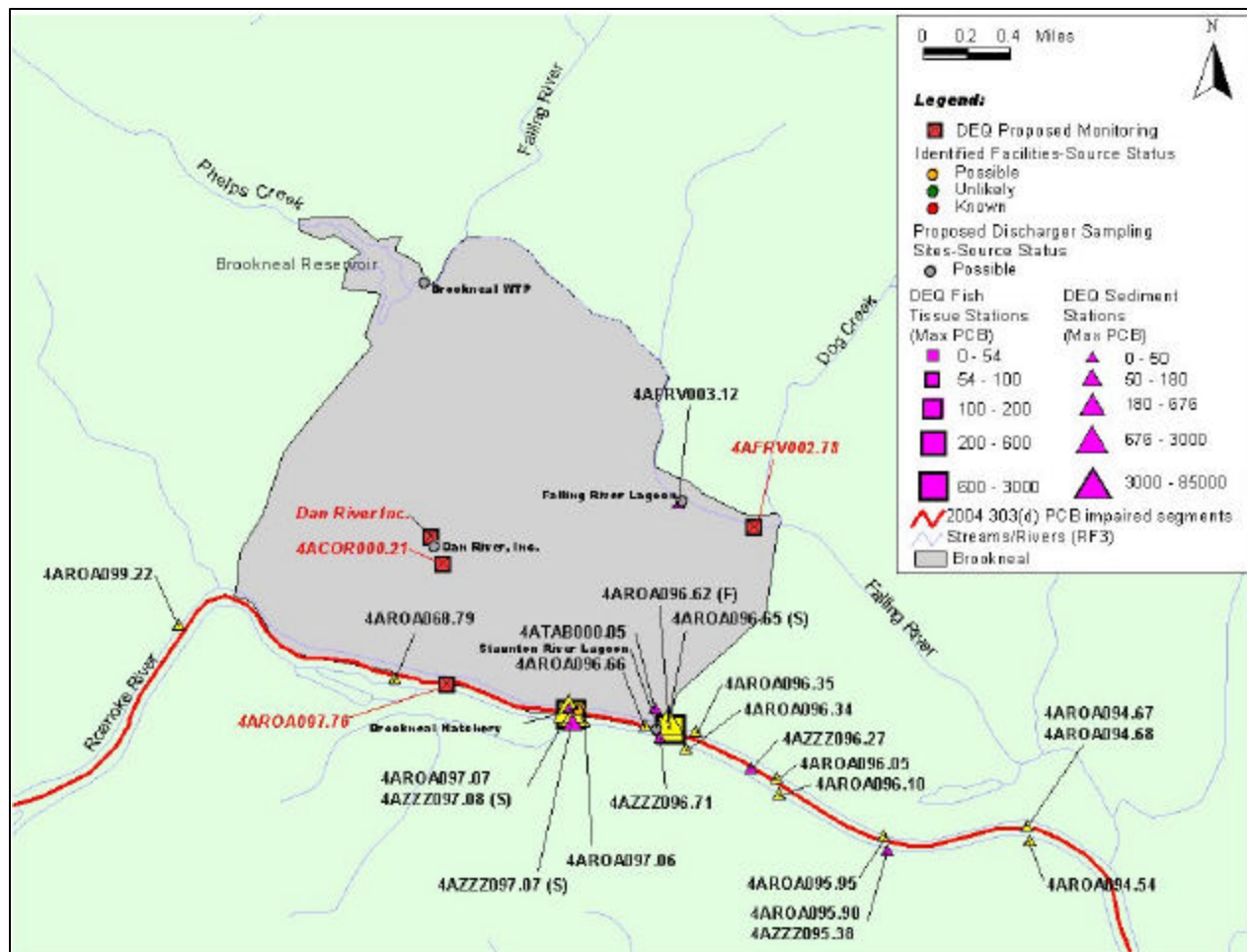


Figure 2. Fish tissue and sediment monitoring results, identified facilities/sites, and DEQ proposed monitoring locations in and around the City of Roanoke





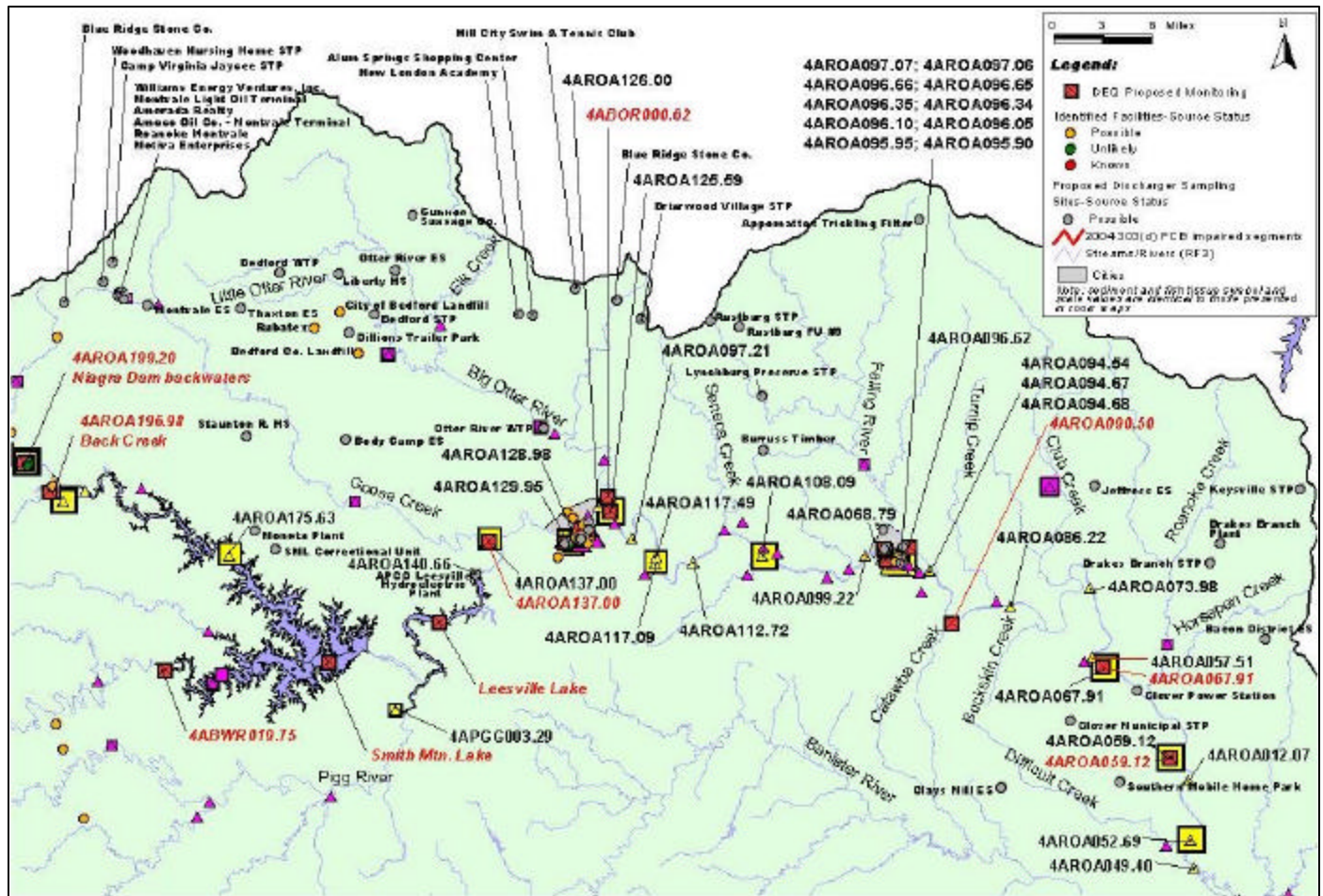


Figure 6. Fish tissue and sediment monitoring results, identified facilities/sites, and DEQ proposed monitoring locations in the Staunton River watershed